Low-threshold optically pumped lasing in highly strained germanium nanowires

Abstract
The integration of efficient, miniaturized group IV lasers into CMOS architecture holds the key to the realization of fully functional photonic-integrated circuits. Despite several years of progress, however, all group IV lasers reported to date exhibit impractically high thresholds owing to their unfavourable bandstructures. Highly strained germanium with its fundamentally altered bandstructure has emerged as a potential low-integrated circuits. Despite several years of progress, however, all group IV lasers reported to date exhibit impractically high thresholds owing to their unfavourable bandstructures. Highly strained germanium can sufficiently overcome optical losses at 83 K, thus allowing the observation of multimode lasing with an optical pumping threshold density of ~3.0 kW cm\(^{-2}\). Our demonstration opens new possibilities for group IV lasers for photonic integrated circuits.

Design of strained Ge nanowire lasers

Theoretical modelling (83K)

Lasing characteristics (83K)

Temperature-dependent emission

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